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10/579,513	04/30/2008	Martin J. Fisher	KCK-002	6505

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BOSTON, MA 02109-2881

EXAMINER
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BOBISH, CHRISTOPHER S

ART UNIT	PAPER NUMBER
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3746

NOTIFICATION DATE	DELIVERY MODE
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08/01/2011

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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<b>Office Action Summary</b>	<b>Application No.</b> 10/579,513	<b>Applicant(s)</b> FISHER ET AL.	
	<b>Examiner</b> CHRISTOPHER BOBISH	<b>Art Unit</b> 3746	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 11/22/2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-3 and 6-10 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3 and 6-10 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 May 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>05/12/2006, 11/22/2006, 06/22/2009</u> .                      | 6) <input type="checkbox"/> Other: _____                          |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gragert (US Patent No. 724,569) in view of Notzon (US Patent No. 6,622,612) in view of Black (US Patent No. 1,721,245).

Gragert teaches:

limitations from claim 1, an energy efficient pump apparatus, comprising: a first closed conduit (8) having a first and a second end; a first movable piston (11) having a closed end having an effective length A greater than a median radius of the first closed conduit (see FIG. 2); and a drive member (10) connected to a top end of the first movable piston (11) and operable to move the first movable piston up and down along the first closed conduit, thereby enabling the first movable piston to displace fluid along the first closed conduit (Page 1 Lines 98-102);

Gragert does not teach a hydrodynamic seal between the piston and conduit.

Notzon teaches

limitations from claim 1, a pump including a moveable plunger (5) and a closed conduit (51); such that a first gap having a predefined median size is formed between the first movable piston and the first closed conduit; (i) wherein the first movable piston is movable in the first closed conduit at a velocity relative to the first closed conduit such that as the first movable piston moves along the first closed conduit, the first movable piston creates a substantially tortuous leak path forming a hydrodynamic seal between the first movable piston and the first closed conduit (C. 2 Lines 43-63 teach a gap with a hydrodynamic seal creating a tortuous path); (ii) an efficiency of the hydrodynamic seal is based on the predefined median size of the first gap, the effective length A of the first movable piston, and the velocity of the first movable piston (one of ordinary skill in the art would find it obvious that the dimensions and method of use of the piston and hydrodynamic seal would have a direct effect on the efficiency of the seal);

It would have been obvious to one of ordinary skill in the art of pumps at the time of the invention to utilize a hydrodynamic seal within the pump of Gragert, as taught by Notzon, in order to reduce the need for separate seal parts which are subject to wear and failure.

Neither Gragert nor Notzon explicitly teach that the drive member (10 from Gragert) is flexible.

Black teaches the use of a flexible drive member (~7) for driving a piston (2) within a conduit (1) in order to pump a fluid (Page 1 Lines 91-105);

It would have been obvious to one of ordinary skill in the art of pumps at the time of the invention to provide a flexible drive member in the pump taught by Gragert and modified by Notzon, as taught by Black, in order to reduce wear, improve piston sliding and reduce wear due to misalignment (Page 1 Lines 1-54 of Black).

Gragert, Notzon and Black disclose and teach of the pump in claim 1.

Gragert further teaches:

limitations from claim 2, wherein the movable piston comprises a one way valve (13) disposed therein, and the first moveable piston (11) and the first closed conduit (8) are arranged in such a way that when the piston is moved back and forth along the first conduit, the movable piston pulls and pumps fluid along the conduit (Page 1 Lines 81-102);

limitations from claim 3, wherein the first closed conduit is positioned at an angle other than horizontal (see FIG. 2) said the first closed conduit (8) further comprises a one-way inlet valve (14) at a lower portion thereof, and the first movable piston (11) and the first closed conduit are arranged such that when the first movable piston is moved up and down along the first closed conduit, fluid is pulled into and pumped up the first closed conduit (Page 1 Lines 81-102);

limitations from claim 6, further comprising a pipe (3) having a top end and a bottom end, wherein (i) the bottom end of the pipe is attached to the top end of the first closed conduit (8), (ii) during an up-stroke of the pump apparatus, the first movable piston (11) is pulled up by the flexible drive member (10), and during a down-stroke of the pump apparatus, the first movable piston is pulled down by gravity (Page 1 Lines 89-91), thereby pulling and pumping fluid into and up the pipe;

limitations from claim 7, a second closed conduit (9) having a top end and a bottom end, and including an outlet (5) disposed at a lower end of the second

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closed conduit; and a second movable piston (12) loosely disposed within the second closed conduit; such that a second gap having a predefined median size is formed between the second movable piston and the second closed conduit (FIG. 2), the second movable piston including a rigid drive member (10, above the piston), wherein the bottom end of the second closed conduit (9) is attached to the top end of the pipe (3), and during operation of the pump apparatus the first and second movable pistons (11, 12) move in the respective first and second closed conduits (8, 9) to facilitate fluid flow into the first closed conduit, such that the fluid flows into and up the pipe on the up-stroke, and out of the outlet under pressure on the down-stroke (Page 1 Lines 81-102);

limitations from claim 8, further comprising an outlet pipe (4) connected to the outlet at the lower end of the second closed conduit (9) and a one-way outlet valve (7) disposed in the outlet pipe to limit the amount of force required to move the first and second movable pistons on the up-stroke (Page 2 Lines 25-34);

Claims 1, 6-7 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Robaugh (US Patent No. 149,953) in view of Notzon (US Patent No. 6,622,612) in view of Black (US Patent No. 1,721,245).

Robaugh teaches:

limitations from claim 1, an energy efficient pump apparatus, comprising: a first closed conduit (lower half of tube A) having a first and a second end; a first movable piston (A2) having a closed end having an effective length A greater

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than a median radius of the first closed conduit (see provided Figure); and a drive member (D2) connected to a top end of the first movable piston (A2) and operable to move the first movable piston up and down along the first closed conduit, thereby enabling the first movable piston to displace fluid along the first closed conduit (see entire document);

Robaugh does not teach a hydrodynamic seal between the piston and conduit.

Notzon teaches

limitations from claim 1, a pump including a moveable plunger (5) and a closed conduit (51); such that a first gap having a predefined median size is formed between the first movable piston and the first closed conduit; (i) wherein the first movable piston is movable in the first closed conduit at a velocity relative to the first closed conduit such that as the first movable piston moves along the first closed conduit, the first movable piston creates a substantially tortuous leak path forming a hydrodynamic seal between the first movable piston and the first closed conduit (C. 2 Lines 43-63 teach a gap with a hydrodynamic seal creating a tortuous path); (ii) an efficiency of the hydrodynamic seal is based on the predefined median size of the first gap, the effective length A of the first movable piston, and the velocity of the first movable piston (one of ordinary skill in the art would find it obvious that the dimensions and method of use of the piston and hydrodynamic seal would have a direct effect on the efficiency of the seal);

It would have been obvious to one of ordinary skill in the art of pumps at the time of the invention to utilize a hydrodynamic seal within the pump of Robaugh, as taught by Notzon, in order to reduce the need for separate seal parts which are subject to wear and failure.

Neither Robaugh nor Notzon explicitly teach that the drive member is flexible.

Black teaches the use of a flexible drive member (~7) for driving a piston (2) within a conduit (1) in order to pump a fluid (Page 1 Lines 91-105);

It would have been obvious to one of ordinary skill in the art of pumps at the time of the invention to provide a flexible drive member in the pump taught by Robaugh and modified by Notzon, as taught by Black, in order to reduce wear, improve piston sliding and reduce wear due to misalignment (Page 1 Lines 1-54 of Black).

Robaugh, Notzon and Black disclose and teach of the pump in claim 1.

Robaugh further teaches:

limitations from claim 6, further comprising a pipe (E) having a top end and a bottom end, wherein (i) the bottom end of the pipe is attached to the top end of the first closed conduit (A), (ii) during an up-stroke of the pump apparatus, the first movable piston (A2) is pulled up by the flexible drive member (D2), and during a down-stroke of the pump apparatus, the first movable piston is pulled down by gravity (along with the reduced friction of the seal), thereby pulling and pumping fluid into and up the pipe (see entire document);

limitations from claim 7, a second closed conduit (D) having a top end and a bottom end, and including an outlet (opening at the lower end of the inner tube) disposed at a lower end of the second closed conduit; and a second movable piston (D1) loosely disposed within the second closed conduit; such that a second gap having a predefined median size is formed between the second movable piston and the second closed conduit (see the provided Figure), the



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second movable piston including a rigid drive member (D2), wherein the bottom end of the second closed conduit (D) is attached to the top end of the pipe (E), and during operation of the pump apparatus the first and second movable pistons (A2, D1) move in the respective first and second closed conduits (A, D) to facilitate fluid flow into the first closed conduit, such that the fluid flows into and up the pipe on the up-stroke, and out of the outlet under pressure on the down-stroke (see entire document);

limitations from claim 9, further comprising: a closed sleeve outlet conduit comprising a closed sleeve (larger diameter portion of Tube A) and an outlet pipe (E) connected to an upper portion of the closed sleeve, the closed sleeve outlet conduit covering the second closed conduit (D) and creating a second gap (see the figure) between an outer wall of the second closed conduit and an inner wall of the closed sleeve, such that the second gap is sealed both at a bottom and a top of the closed sleeve outlet conduit, and such that substantially any fluid flowing through the outlet at the lower end of the second closed conduit flows into the second gap (see Figure), wherein during operation of the pump apparatus the first and second movable pistons (A2, D1) move in the respective first and second closed conduits (A, D) to facilitate fluid flow into (i) the first closed conduit, into and up the pipe and into the second closed conduit during the up-stroke, and (ii) through the opening of the second closed conduit, into the sleeve-conduit gap and out of the outlet pipe under pressure during the down-stroke (see entire document);

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Robaugh (US Patent No. 149,953) in view of Notzon (US Patent No. 6,622,612) in view

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of Black (US Patent No. 1,721,245) as applied to claims 1, 6-7 and 9 above, and in further view of Gragert (US Patent No. 724,569).

Robaugh, Notzon and Black disclose and teach of the pump in claims 1, 6-7 and 9 above, but do not teach a check valve in the outlet pipe.

Gragert teaches:

limitations from claim 8, a pump comprising an outlet pipe (4) connected to an outlet (5) at a lower end of the second closed conduit (9), and a one-way outlet valve (7) disposed in the outlet pipe to limit the amount of force required to move the first and second movable pistons on the up-stroke (Page 2 Lines 25-34);

It would have been obvious to one of ordinary skill in the art of pumps at the time of the invention to provide a valve in the outlet of the pump taught by Robaugh and modified by Notzon and Black, as taught by Gragert, in order to relieve pressure on the pistons during reciprocation.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to CHRISTOPHER BOBISH whose telephone number is (571)270-5289. The examiner can normally be reached on Monday through Thursday, 7:30 - 6:00.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Devon Kramer can be reached on (571)272-7118. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Christopher Bobish/  
Examiner, Art Unit 3746

/Charles G Freay/  
Primary Examiner, Art Unit 3746

/C. B./  
Examiner, Art Unit 3746